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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/502,512	07/23/2004	Shinichiro Takabayashi	MAT-8575US	5928

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EXAMINER	
MATIN, NURUL M	

ART UNIT	PAPER NUMBER
2635	

DATE MAILED: 11/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/502,512	TAKABAYASHI ET AL.	
	Examiner	Art Unit	
	Nurul M. Matin	2635	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07/23/2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/23/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 1,3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka, US 6915118, and further in view of Gourgue et al, US 6400775 and Matsuoka et al, US 6400774.

Re claim 1, Matsuoka (US ref.118) discloses a distortion compensator comprising (Matsuoka, ref.118, fig.1, col.1, line 44): an amplitude phase control section for controlling an amplitude and phase of a transmission base-band signal (ref.118, fig.1, col. 3, line 19-20 " one of the output is fed into phase and amplitude controller, 109, where the signal is controlled"); an quadrature modulating section for orthogonally modulating an output of the amplitude phase control section (ref.118, fig.1, col. 3,line 20-22 "as to be the same as the output of second quadrature modulator 108 in amplitude and opposite in phase"); a power amplifier for amplifying an output of the quadrature modulating section(ref.118, fig.1,col 3, line 23-26 "directional coupler 110 synthesizes the output of quadrature modulator 108 and the output of phase and amplitude controller 109 so as to extract non- linear distortion components generated in main power amplifier 106"); a directional coupler for distributing an output of the power amplifier(ref.118, fig. 1, col. 3, line 17-18 " the output from power amplifier 106 is

bifurcated by directional coupler 107"); a fixed-coefficient storing section for storing a characteristic reverse to a pre-measured input/output characteristic of the power amplifier(ref.118, fig.2, col. 2, line 59-60, col. 3, line 2-10); **but he fails to teach the following limitations**: a Fourier transform section for Fourier-transforming an output of the frequency converter; an out-band power computing section for computing an out-band power from an output of the Fourier transform section; a frequency converter for frequency-converting one of outputs of the directional coupler; an amplitude computing section for computing an amplitude value of the transmission base-band signal; an error coefficient computing section for computing an error characteristic from a stored characteristic in the fixed coefficient storing section, on the basis of an output of the out-band power measuring section; and an amplitude phase change amount computing section for computing a change amount of amplitude and phase on the basis of outputs of the fixed coefficient storing section and the error coefficient computing section, and instructing the amplitude phase control section to carry out the control on the basis of the change amount of amplitude and phase. **However, Gourgue et al (ref. 775), teaches** a Fourier transform section for Fourier-transforming an output of the frequency converter (Gourgue 775, col. 1,line 66-67, " the Fourier transform is applied to the samples of the amplified test signal"); an out-band power computing section for computing an out-band power from an output of the Fourier transform section (Gourgue 775, col. 1, line 66-col. 2, line 3); **and Matsuoka et al, reference 774**, discloses a frequency converter for frequency-converting one of outputs of the directional coupler (ref.774, col. 1, line 25-29 " a first frequency converter following the modulator changes

the modulation-resultant signal into a corresponding RF signal. Then, the RF power amplifier following the first frequency converter amplifies the RF signal"); an amplitude computing section for computing an amplitude value of the transmission base-band signal (ref.774, col. 24, line 27-30, " the power calculating portion 102 estimates or calculates an amplitude of the supposed analog signal from the digital base-band I signal and the digital base-band Q signal"); an error coefficient computing section for computing an error characteristic from a stored characteristic in the fixed coefficient storing section, on the basis of an output of the out-band power measuring section(ref. 774, fig.5, col. 30, line 57-64, " the coefficient updating portion 223 calculates an error between a pair of the input digital base-band I and Q signals and a pair of the recovered digital base-band I and Q signals"); and an amplitude phase change amount computing section for computing a change amount of amplitude and phase on the basis of outputs of the fixed coefficient storing section and the error coefficient computing section, and instructing the amplitude phase control section to carry out the control on the basis of the change amount of amplitude and phase(ref. 774, col. 41, line 52-63 " the coefficient updating portion 827 generates a control signal, and feeds the control signal to the switch 823. The switch 823 is changed in response to the control signal fed from the coefficient updating portion 827").

Therefore, the combined teaching of Matsuoka118, Matsuoka 774, Gourgue as a whole would have been rendered obvious the arrangement of a Fourier transform section for Fourier-transforming an output of the frequency converter; an out-band power computing section for computing an out-band power from an output of the

Fourier transform section as claimed for the benefit of a linearization method comprising a prior testing stage and an amplification stage to determine the distortion parameters specific to the amplifier and the amplified signal at the output of the amplifier is not distorted(ref.775, col. 1, line 60- col. 2, line 10) and **also the other arrangement of** a frequency converter for frequency-converting one of outputs of the directional coupler; an amplitude computing section for computing an amplitude value of the transmission base-band signal; an error coefficient computing section for computing an error characteristic from a stored characteristic in the fixed coefficient storing section, on the basis of an output of the out-band power measuring section; and an amplitude phase change amount computing section for computing a change amount of amplitude and phase on the basis of outputs of the fixed coefficient storing section and the error coefficient computing section, and instructing the amplitude phase control section to carry out the control on the basis of the change amount of amplitude and phase as claimed for the benefit of a system which can compensate for a signal distortion caused by a nonlinearity of a modulator(ref. 774, col.2, line 7-9).

Re claim 3, A distortion compensator according to claim 1, wherein the error coefficient computing section is to compute a polynomial having, as a variable, an amplitude value of a transmission base-band signal or transmission RF signal, to update a coefficient of the polynomial from the out-band power (Gourgue 775, col. 4, line 59-62, col.9, line 7-10 " the transfer function modeling the amplifier may be given in RF by a polynomial, it nevertheless being possible to determine the complex

coefficients of such a polynomial in base-band and it can be noted that the phase and amplitude distortions of the amplifier depends only on the instantaneous power P(x) of the input signal").

Re claim 4, A distortion compensator according to claim 1, wherein the out-band power computing section has a power computing section for computing an adjacent channel leak power ratio and a determining section for determining whether the adjacent channel leak power ratio is equal to or smaller than a predetermined value or not, to instruct the power amplifier to halt operation when the adjacent channel leak power ratio is greater than the predetermined value (ref. 775, col.1, line 25-38, also col.3, line 39-47 "In radio communications systems, the non-linearity of the amplifier in the radio transmission system is detrimental because it distorts the transmitted signal, thereby degrading the spectrum of the signal, and thus causing interference signals to be generated in channels adjacent to the working channel. It is important to note that the fact that a modeled amplifier is used makes it possible to obtain improved accuracy on the correction parameters to be applied to the input signal, and thus improved linearization of the amplifier. In general, the closer the modeled amplifier is to the real amplifier, the better the resulting linearization. It is recalled that, when applied to a mobile terminal, the linearization method of the invention makes it possible to limit interference between channels").

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka, US 6915118, in view of Gourgue et al, US 6400775 and Matsuoka et al, US 6400774, and further in view of Kusunoki, US 6766151.

Re claim 2, Matsuoka 118, Matsuoka 774, Gourgue 775, discloses a distortion compensator comprising: a variable attenuator for controlling an amplitude of a transmission RF signal (ref.118, col.4, line 64-col.5, line 2, " one of the output is fed into phase and amplitude controller109 (as variable controller which control the amplitude), where the signal is controlled"); a variable phase unit for controlling a phase on an output of the variable attenuator (ref. 118, same as col. 4, line 64-65, where it says phase and amplitude controller 109); a power amplifier for amplifying an output of the variable phase unit(ref. 118, fig. 4, col. 5, line 13-16, " phase controller 112 controls the output of main power amplifier 106"); a directional coupler for distributing an output of the power amplifier(see claim 1); a frequency converter for frequency-converting one of outputs of the directional coupler(see claim 1); a Fourier transform section for Fourier-transforming an output of the frequency converter(see claim 1); an out-band power computing section for computing an out-band power from an output of the Fourier transform section(see claim 1); a fixed coefficient storing section for storing a characteristic reverse to a pre-measured input/output characteristic of the power amplifier(see claim 1); an error coefficient computing section for computing an error characteristic of from a stored characteristic in the fixed coefficient storing section(see claim 1), on the basis of an output of the out-band power measuring section; and an amplitude phase change amount computing section for computing a change amount of

amplitude and phase on the basis of outputs of the fixed coefficient storing section and the error coefficient computing section, and instructing the variable attenuator and the variable phase unit to carry out the control on the basis of the change amount of amplitude and phase(see claim 1); **but the combined teaching of Matsuoka 118, Matsuoka 774 and Gourgue 775 as a whole fails to teach that an envelope detecting section for outputting an amplitude value of an envelope on the transmission RF signal.** However, Kusunoki discloses that an envelope detecting section for outputting an amplitude value of an envelope on the transmission RF signal (col. 2, line 53-61, " a distortion compensating apparatus for detecting envelope signals of an RF (radio frequency) input signal generating envelope variations").

Therefore, the combined teaching of Matsuoka118, Matsuoka 774, Gourgue 775 and Kusunoki (151) as a whole would have been rendered obvious the arrangement of an envelope detecting section for outputting an amplitude value of an envelope on the transmission RF signal as claimed for the benefit to perform predistortion for controlling amplitude characteristics of power amplifying (rer.151, col. 2, line 56-57).

Conclusion

4. The prior art made of record and not replied upon is considered pertinent to applicant's disclosure.

a. Nagatani et al pertains to the method an apparatus for compensating for distortion in radio apparatus.

b. Nakajima pertains to the transmitter and distortion compensation method to be used therefor.

Contact

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nurul M. Matin whose telephone number is 571-270-1188. The examiner can normally be reached on mon-fri (7:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vu Le can be reached on 571-272-7332. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Nurul Matin

LIN YE
PRIMARY EXAMINER